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(54) **LOOKING DEVICE FOR LOCKING A SIL TO A MASTHEAD**

ARRETIERUNGSVORRICHTUNG ZUR ARRETIERUNG EINES SEGELS AN EINER MASTSPITZE

DISPOSITIF DE VERROUILLAGE ADAPTÉ AU NIVEAU D'INTÉGRITÉ DE SÉCURITÉ SUR UNE TÊTE DE MÂT

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Description

Field of the invention

[0001] The present invention relates to a locking device of a sail to respective mast, used for example on large-size sailboats, which allows to relieve the working load of the halyard, thus reducing the load on the masthead.

Background art

[0002] Sailboats are provided with at least one mast, to which a given number of sails are fixed to allow sailing. In particular, on large-size sailboats the sails are hoisted onto the mast by means of appropriate winches, ropes and pulleys. Some systems for hoisting the sails, e.g. the mainsail, provide for fixing the upper end of the sail, named sail head, to a carriage, which can run on a specific rail provided on the mast. Since the sail head is provided with at least one hole, such a carriage is also provided with at least one hole, so that the sail head can be tied to the carriage by means of a rope. These systems may also include a locking system of the carriage typically near the upper end of the mast, or masthead. By virtue of the locking system, the ropes and winches are subjected to loads lower and can be dimensioned accordingly.

[0003] However, it is known that the material with which the sails are made is subject to yielding which determines a dimensional variation of the sail. The main causes of such yielding are wear or strong gusts of wind while sailing. The dimensional variations of the sail determine sailing in non-optimal conditions. Thus, when such locking systems are used, the sail head must be tied to the carriage according to the actual size of the sail so as to adjust the position of the sail head with respect to the mast and arrange the sail for better sailing. Such an adjustment may be necessary also for other reasons in addition to the dimensional variations of the sail, e.g. to adapt the tension of the sail according to wind speed.

[0004] However, the adjustment performed in this manner implies many disadvantages. Firstly, an adjustment of only a few centimeters is obtained. Furthermore, it is necessary for a person to tie the sail head to the carriage. Consequently, such an operation implies a burden, is inevitably subject to human error, and takes a relatively long time. In particular, if the adjustment is needed while sailing, the carriage must be taken to the operator's height, with the consequent impossibility of using the sail, and returned to the masthead after the adjustment. Furthermore, the efficacy of the adjustment can only be verified after having resumed sailing and the operation described above must be repeated if it is found to be insufficient. Such disadvantages are even more apparent for large-size sailboats, i.e. of length equal to or greater than 20 m.

[0005] An example of solution suggested in the prior art is disclosed in document FR2978952.

[0006] The need is thus felt to make a head locking device which allows to overcome the aforesaid drawbacks.

Summary of the invention

[0007] It is an object of the present invention to provide a locking device of the sail head to the masthead of a sailboat, which allows a rapid, easy and accurate adjustment of the position of the sail head with respect to the mast.

[0008] It is another object of the present invention to provide a locking device of the sail head to the mast of a sailboat, which allows an automated adjustment of the position of the sail head with respect to the manual solutions of the prior art.

[0009] A further object of the invention is to provide a device which allows the aforesaid adjustment while sailing without needing to take the sail to non-operative conditions, allowing a better and efficient adjustment of the sail in case of yielding of the fabric or of variations of the wind force.

[0010] The present invention, therefore, suggests to achieve the objects discussed above by making a locking device for locking a head of a sail, or sail head, to the masthead of a sailboat, which comprises, according to claim 1:

- a fixed part, defining a longitudinal axis, provided with at least one longitudinal rail, apt to be fixed along the mast, and a frame apt to be fixed at the masthead, in proximity of an end of the rail;
- a moveable part, comprising a carriage, which can slide along said at least one rail and which can be locked to said frame, said sail head being apt to be fixed to said carriage;

wherein it is provided an adjustment mechanism of the locking position of the carriage to the frame,
characterized in that said frame comprises two longitudinal supports, parallel to the longitudinal axis and defining between each other a gap crossed by the at least one rail which can be crossed by the carriage,
and in that said adjustment mechanism comprises

- a plurality of fixed teeth, provided on at least one stretch of the two mutually opposite sides of the carriage,
- and at least two pivoting teeth, each of which is hinged on a respective longitudinal support,

wherein the two pivoting teeth are configured to go from a first operating position, in which the two pivoting teeth protrude from said gap and allow, by pivoting, at least one respective fixed tooth to slide thereon to a predetermined locking position of the carriage, in which each pivoting tooth is inserted between two respective consecutive teeth,

to a second operating position, in which the two pivoting teeth do not protrude into said gap, thus releasing the carriage.

[0011] Advantageously, the adjustment by means of the device of the invention can be performed while sailing without needing to take the sail to non-operative conditions. The carriage can be moved electrically, by means of a specific control panel, or mechanically only, e.g. by means of a rope possibly actuated by a winch. Furthermore, by virtue of the device of the invention, the locking position can be varied along the mast either continuously or discreetly within a wide range, e.g. approximately 30 cm, preferably approximately 20-25 cm. The minimum adjustment step can be, for example, equal to approximately 3 cm. Other minimum steps are however possible.

[0012] According to the invention, the position of the sail head with respect to the mast can be detected by means of one or more sensors, e.g. by means of tooth-counting sensors. The tooth-counting sensors can be electronically connected to one or more indicators, preferably arranged on deck, e.g. near the pilot bridge. The invention is particularly suited to be used for large-size sailboats, e.g. having length equal to or greater than 20 m.

[0013] The dependent claims describe preferred embodiments of the invention.

Brief description of the figures

[0014] Further features and advantages of the invention will be better apparent in the light of the detailed description of a preferred, but not exclusive, embodiment, of a locking device of the sail head to the mast illustrated by way of non-limitative example, with the aid of the accompanying drawings, in which:

Figure 1 shows a perspective view of the device according to the invention fixed to a mast of a sailboat;
Figure 2 shows a side view of the device in Fig. 1;
Figure 3 shows a front view of the device in Fig. 1 ;
Figure 4 shows a fixed part of the device in a first operative position;
Figure 5 shows the fixed part of the device in a second operative position.

[0015] The same reference numbers in the figures identify the same elements or components.

Detailed description of a preferred embodiment of the invention

[0016] Figures 1 and 2 show an embodiment of a device according to the invention, indicated as a whole by reference numeral 1.

[0017] In Figure 1 device 1 is shown together with a part of a mast 2 of a sailboat, the latter not shown. In particular, the upper portion of the mast 2, distal from the hull, which is also named masthead, is shown. At least one rail 3, which defines a longitudinal Y axis, is fixed onto the mast 2. In particular, the at least one rail 3 is fixed onto a longitudinal portion, which is substantially but not necessarily flat, of the outer surface of the mast 2. In a preferred variant there is only one rail 3.

[0018] The device 1, object of the present invention, comprises a fixed part 4, or frame, fixed onto the masthead 2 and a moveable part 5, which can slide along the rail 3. The fixed part 4 is constrained to said substantially flat longitudinal portion of the mast 2 e.g. by means of a plurality of screws and bolts.

[0019] The fixed part 4 comprises two longitudinal supports 6, 7 parallel to each other, which extend along a direction parallel to the Y axis. The longitudinal supports 6, 7 are distanced from one another along an axis X, perpendicular to the Y axis, defining a gap for the passage of the moveable part 5. The inner edges 10, 11, proximal to the Y axis, of the respective longitudinal supports 6, 7 are near the rail 3 which is arranged between the two longitudinal supports 6, 7. The two longitudinal supports 6, 7 are joined by transverse supports or spacers 8, 9, for example two supports, which extend along the X axis and are fixed, e.g. by means of screws, to the substantially flat longitudinal portion of the mast 2, so as to be arranged between such a longitudinal portion and the rail 3. In particular, the fixed part 4 is symmetric to the Y axis (Figures 4-5).

[0020] The fixed part 4 further comprises two double-acting pneumatic cylinders 12, 13 having the longitudinal axis parallel to the Y axis and fixed to a respective longitudinal support 6, 7. Each pneumatic cylinder 12, 13 can be fed with compressed air and is provided with a rod 14, 15, protruding with respect to the chamber of the cylinder, also having the longitudinal axis parallel to the Y axis. The rods 14, 15 are apt to move along a direction parallel to the Y axis under the bias of the compressed air. A first end, proximal to the cylinder 12, 13, of a respective arm or extension 16, 17 is fixed to the lower end of each rod 14, 15. Each arm 16, 17 has a respective longitudinal axis parallel to the Y axis and moves integrally with the respective rod 14, 15. A spring 18, 19 is provided about each rod 14, 15, the ends of which rest respectively on cylinder 12, 13 and on the first end 50, 51 of the arm 16, 17.

[0021] A first end of at least one shaped element 22, 23 is fixed to the second end 20, 21 of each arm 16, 17, distal from the cylinder 12, 13. Each shaped element 22, 23 is hinged at a central zone thereof on a respective longitudinal support 6, 7 and is provided with a second end 24, 25. Each second end 24, 25 can protrude towards the Y axis beyond the inner edge 10, 11 of the respective longitudinal support 6, 7, in a first operating position. Figure 4 shows the second ends 24, 25 of the shaped element 22, 23 in a protruding position from the edges 10, 11. Figure 5, instead, shows the second ends 24, 25 in a second operating position, not protruding from the edges 10, 11, these second ends 24, 25 occupying gaps or seats 24', 25' provided for them on the respective longi-

tudinal support 6, 7. Each shaped element 22, 23 thus defines a pivoting tooth, which pivots about the respective pin 52,53.

[0022] The moveable part 5 of the device 1 of the invention comprises a carriage 28 constrained to the rail 3 so as to be able to slide on it. The carriage 28 is provided with a plate 29, or tablet, in which a through opening 31 is provided. By virtue of the opening 31, the head of a sail, or sail head (not shown), can be fixed to the plate 29, e.g. by tying a rope (not shown). The plate 29 can pivot about the pin 32 which is hinged to an end thereof.

[0023] A plurality of fixed teeth 40, having substantially V-shaped profile, are provided on at least one stretch of each of the two sides of the carriage 28, which extend parallel to the longitudinal axis Y. The protrusions 24, 25 of the two pivoting teeth are shaped so as to be inserted in the gap between one fixed tooth and the next during the upward movement of the carriage 28.

[0024] Alternatively, two or more pivoting teeth hinged on a respective longitudinal support 6, 7 can be provided.

[0025] Advantageously, the two pivoting teeth are configured to move:

from a first operating position, in which the pivoting teeth protrude in the gap between the longitudinal supports 6, 7 and allow, by pivoting, at least one respective fixed tooth 40 to slide thereon to a predetermined locking position of the carriage 28, in which each pivoting tooth is inserted between two respective consecutive teeth,

to a second operating position, in which the two pivoting teeth do not protrude into said gap, thus releasing the carriage 28.

[0026] The operation of the locking device according to the invention is described below.

[0027] Once the head of the sail is fixed to the plate 29, the upward movement of the carriage can be performed electrically by means of a specific control panel which actuates a winch which winds the rope of the sail. By means of the control panel, it is also possible to select a specific locking position of the carriage 28 with respect to the fixed part 4 of the device, i.e. in which gap between the two consecutive fixed teeth 40 the two pivoting teeth will be positioned.

[0028] In a variant of this adjustment, it is possible by virtue of the use of sensors which count the fixed teeth 40 which have gone beyond the two pivoting teeth, by sliding on them. Indeed, such sensors send a tooth counting signal to a control system which received the information of the desired locking position by means of the control panel.

[0029] In a variant, shown in Figures 3-5, two proximity sensors 26, 27 are provided, each proximity sensor being arranged at the lower end of a respective longitudinal support 6, 7. Advantageously, a first end of a slider 43, 44 apt to slide along a guide 46, 47 parallel to the Y axis is also fixed to the second end 20, 21 of each arm 16, 17. A sensor plate 45 is provided on each slider 43, 44. The sensor plate 45 represents the object the presence or absence of which is detected in the immediate proximity of the "sensitive side" of the proximity sensor.

[0030] In the practice, when the carriage 28 moves up along the rail 3, a preselected number of fixed teeth 40 slides on the two pivoting teeth to reach the predetermined locking position. Before the introduction of the moveable part 5, and thus of the fixed teeth 40, into the fixed part 4, the cylinder 12, 13 is fed with compressed air into the chamber on rod side 14, 15 so as to pull in the rod 14, 15 and thus pull up the arm 16, 17, making the pivoting tooth 22, 23 turn about the pin 52, 53 and lowering the ends 24, 25. At the passage of each fixed tooth 40, each pivoting tooth is raised, by pivoting in a first direction about the pin 52, 53, to then return into the next gap between two fixed teeth. When the pivoting teeth are raised, the ends 24, 25 occupy the gap 24', 25' on the respective support 6, 7 and the arm 16, 17 is lowered thus overcoming the force exerted by the cylinder 12, 13 on the rod 14, 15 (Fig. 5). Once the fixed tooth 40 has gone beyond the respective pivoting tooth, the force exerted by the cylinder 12, 13 recalls the arm 16, 17 upwards; consequently, the pivoting tooth is lowered pivoting in a second direction opposite to the first direction about the pin 52, 53 returning to the position of Fig. 4, preventing the downward movement of the carriage 28.

[0031] Whenever the arm 16, 17 is lowered, the respective slider 43, 44 slides downwards along the guide 46, 47 taking the sensor plate 45 to the position of the respective proximity sensor 26, 27. Such a sensor will thus send a signal to the control system on the number of fixed teeth 40 which go beyond the two pivoting teeth. Whenever such a number of fixed teeth reaches the preselected number by means of a control panel, e.g. by means of a LED position signal on the dashboard, the control system blocks the feeding of the carriage 28, and thus its advancement allowing the carriage 28 to be locked in the desired position. The pivoting teeth prevent the carriage 28 from moving downwards, i.e. towards the hull of the boat (not shown).

[0032] In order to lower the sail, instead, the releasing of the carriage 28 is obtained by means of the operation of the winch which winds a small stretch of rope to allow a small upward movement of the carriage 28, followed by the simultaneous operation of the two pneumatic cylinders 12, 13. The bias of the compressed air in the chamber opposite to the chamber on rod side 14, 15 allows the rod 14, 15 to push the arms 16, 17 downwards, thus determining the pivoting of the pivoting teeth, with the ends 24, 25 which occupy the gap 24', 25' on the respective support 6, 7, not protruding beyond the inner edges 10, 11 of the supports 6, 7. In this position, the carriage 28 can be rapidly moved down along the rail 3 carrying down the sail to a non-operating condition. Also in this step of releasing of the carriage, the slider 43, 44 will move down along the respective guide 46, 47, and in this case the proximity sensor 26, 27 will send a signal which

informs the control system that the gap delimited between the inner edges 10, 11 of the supports 6, 7 is completely free.

[0033] If there is no compressed air, e.g. due to malfunctioning of the compression system, the device is configured in the "emergency" situation in which the carriage 28 can move down along the rail 3 carrying down the sail.

[0034] In this emergency configuration, when the carriage 28 is moved slightly upwards by means of the winch, the spring 18, 19 pushes on the arm 16, 17 lowering the rod 14, 15, and thus the tooth 22, 23 turns about the pin 52, 53 taking the ends 24, 25 into the gap 24', 25' on the respective support 6, 7, not protruding beyond the inner edges 10, 11 of the supports 6, 7. In this case, the compressed air missing, the spring 18, 19 keeps the ends 24, 25 in the specific gaps 24', 25', allowing the descent of the carriage 28.

[0035] Alternatively to the proximity sensors 26, 27, other suitable position sensors can be used for counting the fixed teeth which go beyond the pivoting teeth during the step of upward movement of the carriage 28.

[0036] Alternatively to the pneumatic cylinders 12, 13, an end of a respective metallic cable can be provided, on each longitudinal support 6, 7, connected to a respective pivoting tooth and suitable for a manual movement of the respective pivoting tooth from the first operating position in Fig. 4 to the second operating position in Fig. 5.

Claims

1. A locking device (1) for locking a sail head to the masthead of a sailboat, the device comprising

- a fixed part (4, 3), defining a longitudinal axis (Y), provided with at least one longitudinal rail (3), apt to be fixed along the mast, and a frame (4) apt to be fixed at the masthead, in proximity of an end of the rail (3);
- a moveable part (5), comprising a carriage (28), which can slide along said at least one rail (3) and which can be locked to said frame (4), said sail head being apt to be fixed to said carriage (28);

wherein it is provided an adjustment mechanism of the locking position of the carriage (28) to the frame (4),
characterized in that said frame (4) comprises two longitudinal supports (6, 7), parallel to the longitudinal axis (Y) and defining between each other a gap crossed by the at least one rail (3) which can be crossed by the carriage (28),
and **in that** said adjustment mechanism comprises

- a plurality of fixed teeth (40), provided on at least one stretch of the two mutually opposite sides of the carriage (28),
- and at least two pivoting teeth (22, 24; 23, 25), each of which is hinged on a respective longitudinal support (6, 7),

wherein the two pivoting teeth (22, 24; 23, 25) are configured to go from a first operating position, in which the two pivoting teeth protrude from said gap and allow, by pivoting, at least one respective fixed tooth to slide thereon to a predetermined locking position of the carriage (28), in which each pivoting tooth is inserted between two respective consecutive teeth,
to a second operating position, in which the two pivoting teeth do not protrude into said gap, thus releasing the carriage (28).

2. A device according to claim 1, wherein at least one position sensor is provided on the frame (4), apt to detect the position of the carriage (28) with respect to the frame (4) and to send a position signal to a control system suitable to control the locking of the carriage (28) when the latter reaches a pre-selected position.

3. A device according to claim 1 or 2, wherein the fixed teeth (40) and the two pivoting teeth are arranged symmetrically with respect to the longitudinal axis (Y).

4. A device according to any one of the preceding claims, wherein there are provided two position sensors adapted to count the fixed teeth (40) which slide on the pivoting teeth, each position sensor being placed on a respective longitudinal support (6, 7) of the frame (4).

5. A device according to claim 4, wherein said position sensors are proximity sensors (26, 27).

6. A device according to any one of the claims from 1 to 5, wherein there is provided a respective pneumatic cylinder (12, 13) on each longitudinal support (6, 7), each pneumatic cylinder (12, 13) being apt to move a respective pivoting tooth (24, 25) from said first operating position to said second operating position.

7. A device according to any one of the claims from 1 to 5, wherein there is provided an end of a respective metal cable on each longitudinal support (6, 7), which cable is connected to a respective pivoting tooth and suitable to move the respective pivoting tooth manually from said first operating position to said second operating position.

8. A sailboat comprising at least one mast (2) provided with a respective locking device (1), according to any one of the preceding claims, to lock a sail head to a

masthead in adjustable manner.

Patentansprüche

1. Eine Arretiervorrichtung (1) zur Arretierung eines Segelendes an die Mastspitze eines Segelbootes, wobei die Vorrichtung aufweist:

   - ein feststehendes Teil (4, 3), das eine Längsachse (Y) definiert und mit mindestens einer Längsschiene (3) versehen ist, die entlang des Mastes befestigt werden kann, und einem Rahmen (4), der in der Nähe eines Schienenendes (3) an der Mastspitze befestigt werden kann;
   - ein bewegliches Teil (5), das einen Schlitten (28) aufweist, der entlang der mindestens eine Schiene (3) gleiten kann und der an dem Rahmen (4) arretierbar ist, wobei der Segelkopf geeignet ist, an dem Schlitten (28) befestigt zu werden;

   wobei ein Verstellmechanismus für die Arretierposition des Schlitten (28) am Rahmen (4) vorgesehen ist, **dadurch gekennzeichnet,**
   dass der Rahmen (4) zwei Längsstützen (6, 7) aufweist, die parallel zur Längsachse (Y) sind und zwischen denen ein Spalt definiert ist, der von der mindestens eine Schiene (3) durchquert wird, welche vom Schlitten (28) überfahren werden kann, und
   dass der Verstellmechanismus Folgendes aufweist:

   - eine Vielzahl von festen Zähnen (40), die auf zumindest auf einem Abschnitt der beiden gegenüberliegenden Seiten des Wagens (28) vorgesehen sind, und
   - mindestens zwei schwenkbare Zähne (22, 24; 23, 25), die jeweils an einer entsprechenden Längsstütze (6, 7) drehbar angebracht sind,
   wobei die beiden schwenkbaren Zähne (22, 24; 23, 25) so ausgebildet sind, dass sie
   - aus einer ersten Betriebsstellung, in der die beiden schwenkbaren Zähne aus dem genannten Spalt vorstehen und durch Verschwenken zulassen, dass zumindest ein feststehender Zahn darauf zu einer Arretierposition des Schlittens (28) gleitet, in welcher jeder schwenkbare Zahn zwischen jeweils zwei aufeinanderfolgenden Zähnen eingesetzt ist,
   - in eine zweite Betriebsstellung überführbar sind, in der die beiden schwenkbaren Zähne nicht in den Spalt vorstehen, wodurch der Schlitten (28) freigegeben wird.

2. Vorrichtung nach Anspruch 1, wobei am Rahmen (4) mindestens ein Positionssensor vorgesehen ist, der geeignet ist, die Position des Schlittens (28) in Bezug auf den Rahmen (4) zu erfassen und ein Positionssignal an ein Steuersystem zu senden, das geeignet ist, die Verriegelung des Schlittens (28) zu steuern, wenn dieser eine vorgewählte Position erreicht.

3. Vorrichtung nach Anspruch 1 oder 2, wobei die feststehenden Zähne (40) und die beiden schwenkbaren Zähne symmetrisch zur Längsachse (Y) angeordnet sind.

4. Vorrichtung nach einem der vorstehenden Ansprüche, wobei zwei Positionssensoren vorgesehen sind, die dazu geeignet sind, die festen Zähne (40) zu zählen, die auf den schwenkbaren Zähnen gleiten, wobei jeder Positionssensor auf einer entsprechenden Längsstütze (6, 7) des Rahmens (4) angeordnet ist.

5. Vorrichtung nach Anspruch 4, wobei die Positionssensoren Näherungssensoren (26, 27) sind.

6. Vorrichtung nach einem der Ansprüche von 1 bis 5, wobei an jeder Längsstütze (6, 7) ein entsprechender Pneumatikzylinder (12, 13) vorgesehen ist, wobei jeder Pneumatikzylinder (12, 13) geeignet ist, einen entsprechenden schwenkbaren Zahn (24, 25) aus der ersten Betriebsstellung in die zweite Betriebsstellung zu bewegen.

7. Vorrichtung nach einem der Ansprüche von 1 bis 5, wobei an jeder Längsstütze (6, 7) ein Ende eines jeweiligen Metallkabels vorgesehen ist, das mit einem entsprechenden schwenkbaren Zahn verbunden ist und geeignet ist, den jeweiligen schwenkbaren Zahn manuell von der ersten Betriebsposition in die zweite Betriebsposition zu bewegen.

8. Segelboot mit mindestens einem Mast (2), der mit einer entsprechenden Arretiervorrichtung (1) nach einem der vorherigen Ansprüche versehen ist, um einen Segelende auf einstellbare Weise an einer Mastspitze arretiert.

Revendications

1. Dispositif de verrouillage (1) pour verrouiller une tête de voile à la tête de mât d'un voilier, le dispositif comprenant

   - une partie fixe (4, 3), définissant un axe longitudinal (Y), pourvue d'au moins un rail longitudinal (3), capable d'être fixé le long du mât, et d'un cadre (4) capable d'être fixé au niveau de la tête de mât, à proximité d'une extrémité du rail (3) ;
   - une partie mobile (5), comprenant un chariot (28), qui peut coulisser le long dudit au moins un rail (3) et qui peut être verrouillé audit cadre

(4), ladite tête de voile étant capable d'être fixée audit chariot (28) ;

dans lequel il est prévu un mécanisme d'ajustement de la position de verrouillage du chariot (28) au cadre (4),
caractérisé en ce que ledit cadre (4) comprend deux supports longitudinaux (6, 7), parallèles à l'axe longitudinal (Y) et définissant entre eux un espace croisé par l'au moins un rail (3) qui peut être croisé par le chariot (28),
et **en ce que** ledit mécanisme d'ajustement comprend

- une pluralité de dents fixes (40), prévues sur au moins un étirement des deux côtés mutuellement opposés du chariot (28),
- et au moins deux dents pivotantes (22, 24 ; 23, 25), dont chacune s'articule sur un support longitudinal (6, 7) respectif,

dans lequel les deux dents pivotantes (22, 24 ; 23, 25) sont configurées pour passer
d'une première position de fonctionnement, dans laquelle les deux dents pivotantes font saillie depuis ledit espace et permettent, en pivotant, à au moins une dent fixe respective de coulisser sur celles-ci à une position de verrouillage prédéterminée du chariot (28), dans laquelle chaque dent pivotante est insérée entre deux dents consécutives respectives, à une deuxième position de fonctionnement, dans laquelle les deux dents pivotantes ne font pas saillie dans ledit espace, libérant ainsi le chariot (28).

2. Dispositif selon la revendication 1, dans lequel au moins un capteur de position est prévu sur le cadre (4), capable de détecter la position du chariot (28) par rapport au cadre (4) et d'envoyer un signal à un système de commande approprié pour commander le verrouillage du chariot (28) quand ce dernier atteint une position présélectionnée.

3. Dispositif selon la revendication 1 ou 2, dans lequel les dents fixes (40) et les deux dents pivotantes sont agencées de manière symétrique par rapport à l'axe longitudinal (Y).

4. Dispositif selon l'une quelconque des revendications précédentes, dans lequel il est prévu deux capteurs de position adaptés pour compter les dents fixes (40) qui coulissent sur les dents pivotantes, chaque capteur de position étant placé sur un support longitudinal (6, 7) respectif du cadre (4).

5. Dispositif selon la revendication 4, dans lequel lesdits capteurs de position sont des capteurs de proximité (26, 27).

6. Dispositif selon l'une quelconque des revendications 1 à 5, dans lequel il est prévu un cylindre pneumatique (12, 13) respectif sur chaque support longitudinal (6, 7), chaque cylindre pneumatique (12, 13) étant capable de déplacer une dent pivotante (24, 25) respective de ladite première position de fonctionnement à ladite deuxième position de fonctionnement.

7. Dispositif selon l'une quelconque des revendications 1 à 5, dans lequel il est prévu une extrémité d'un câble métallique respectif sur chaque support longitudinal (6, 7), lequel câble est connecté à une dent pivotante respective et approprié pour déplacer la dent pivotante respective manuellement de ladite première position de fonctionnement à ladite deuxième position de fonctionnement.

8. Voilier comprenant au moins un mât (2) pourvu d'un dispositif de verrouillage (1) respectif, selon l'une quelconque des revendications précédentes, pour verrouiller une tête de voile à une tête de mât de manière ajustable.

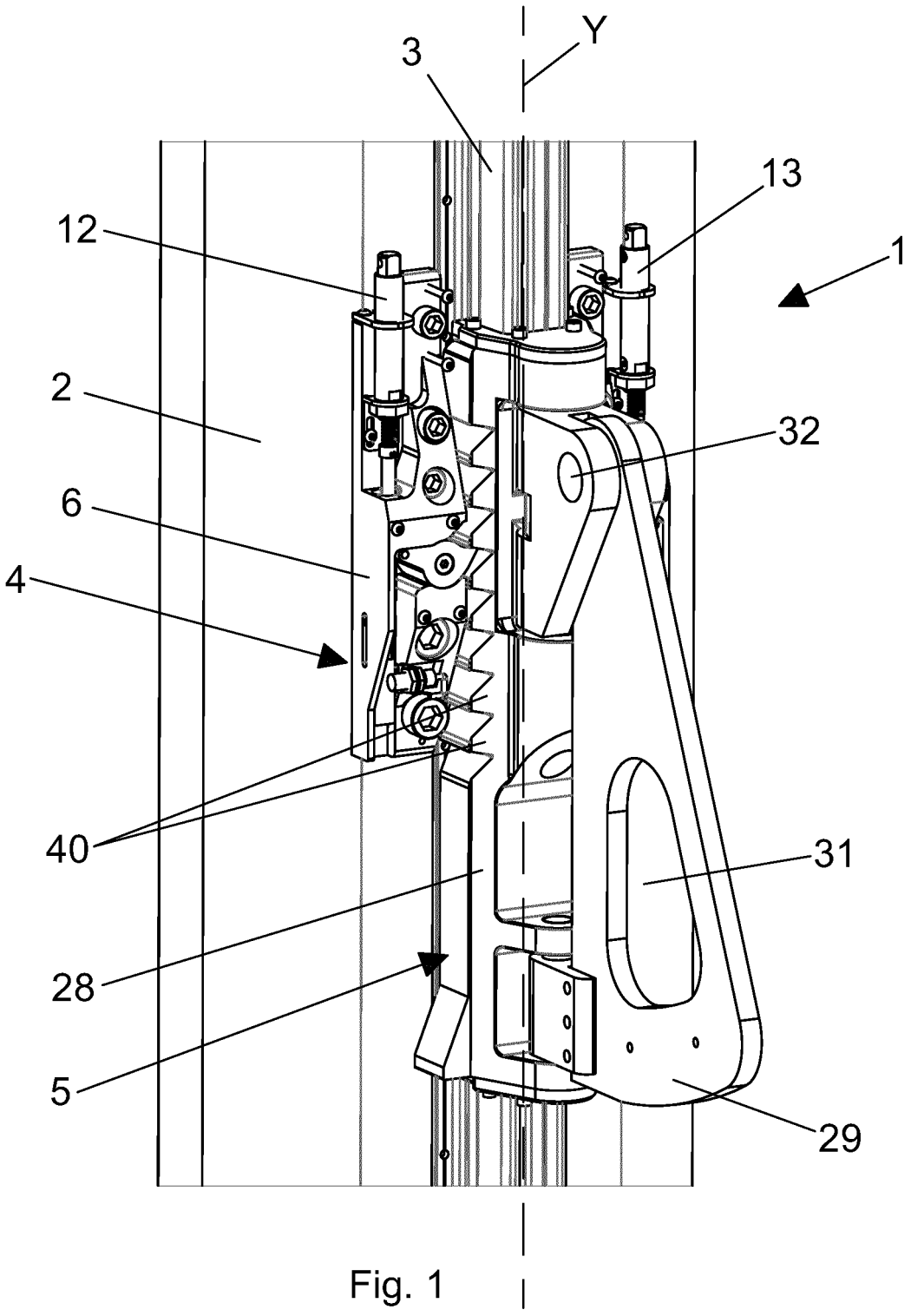

Fig. 1

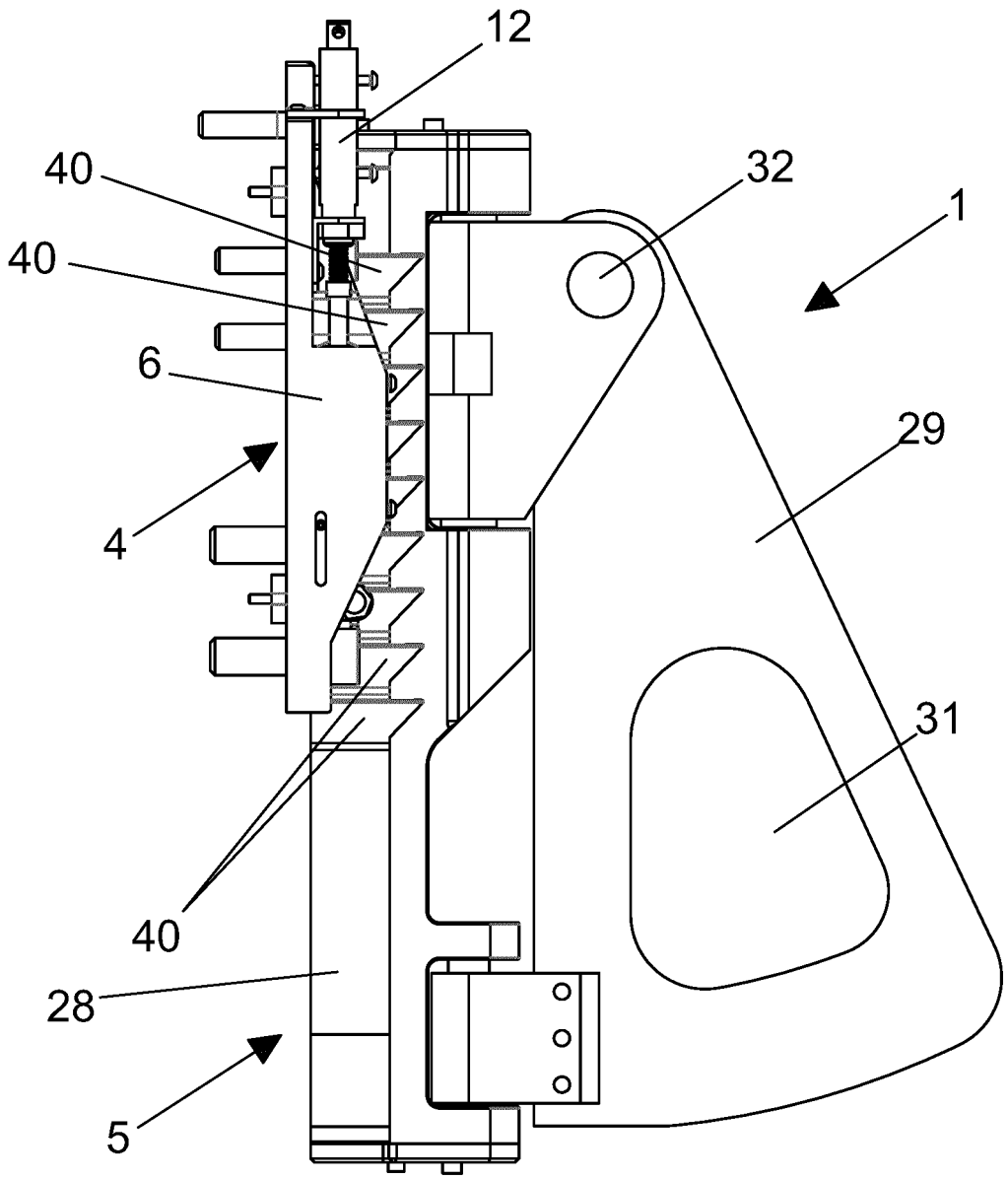

Fig. 2

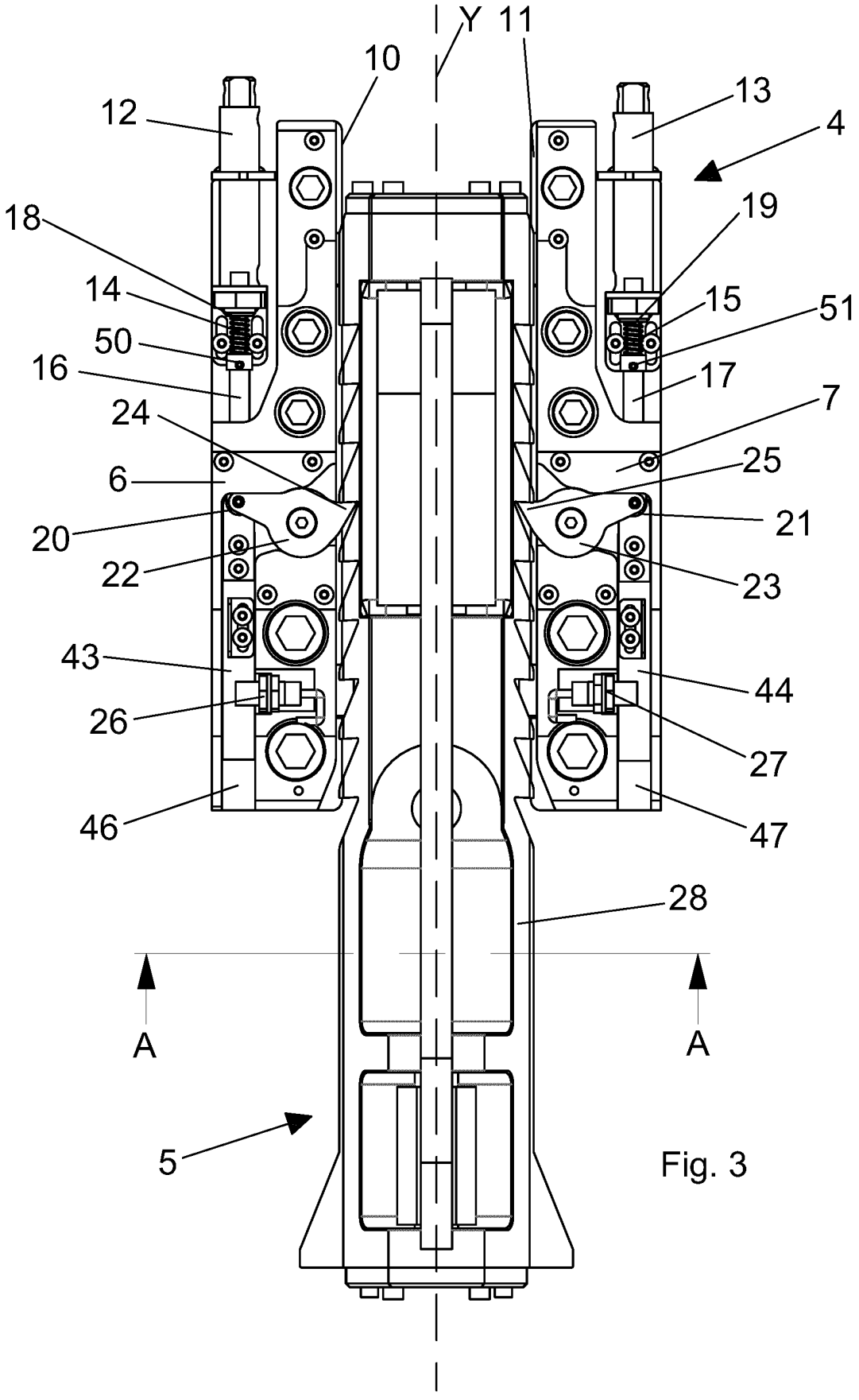
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Fig. 3

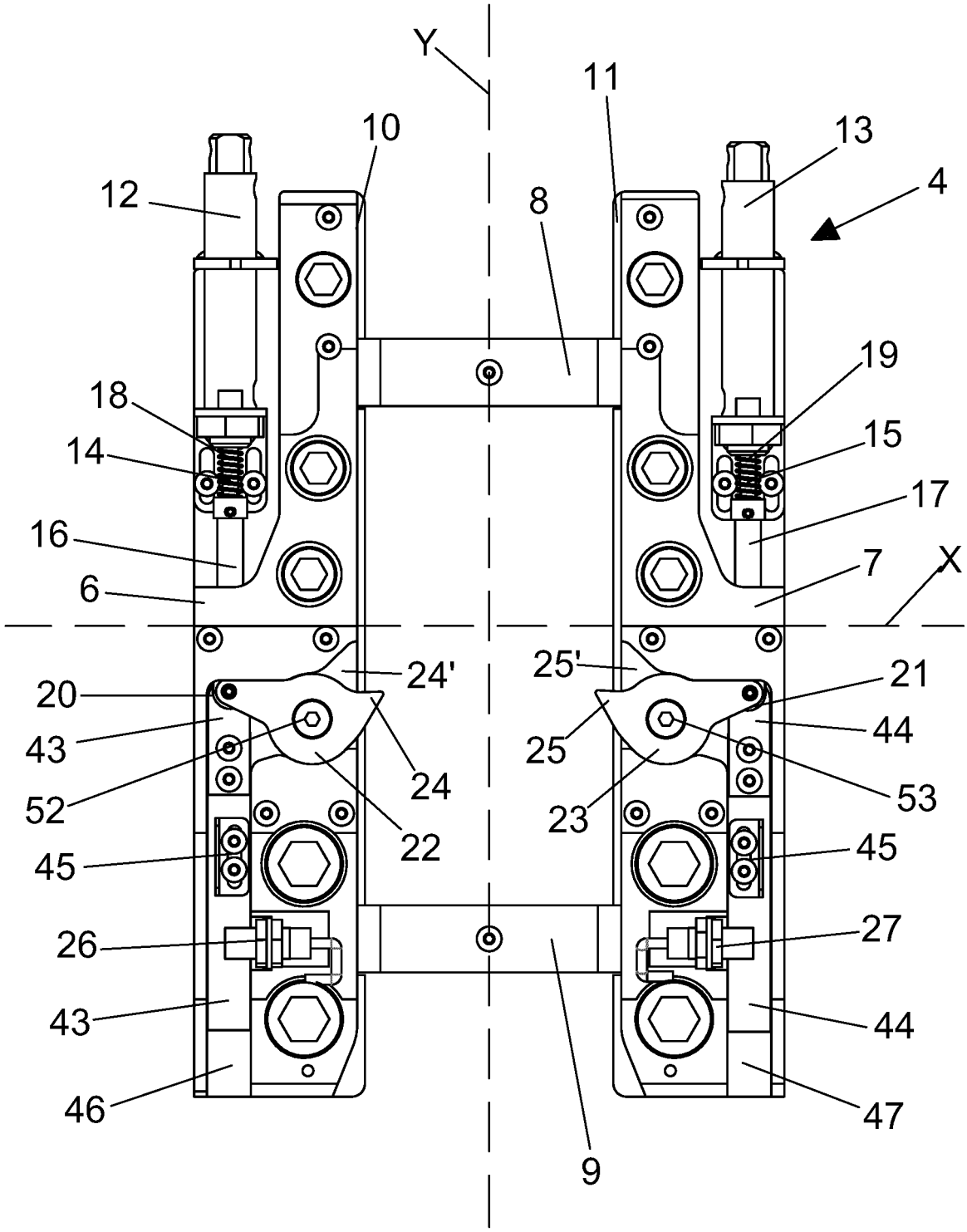
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Fig. 4

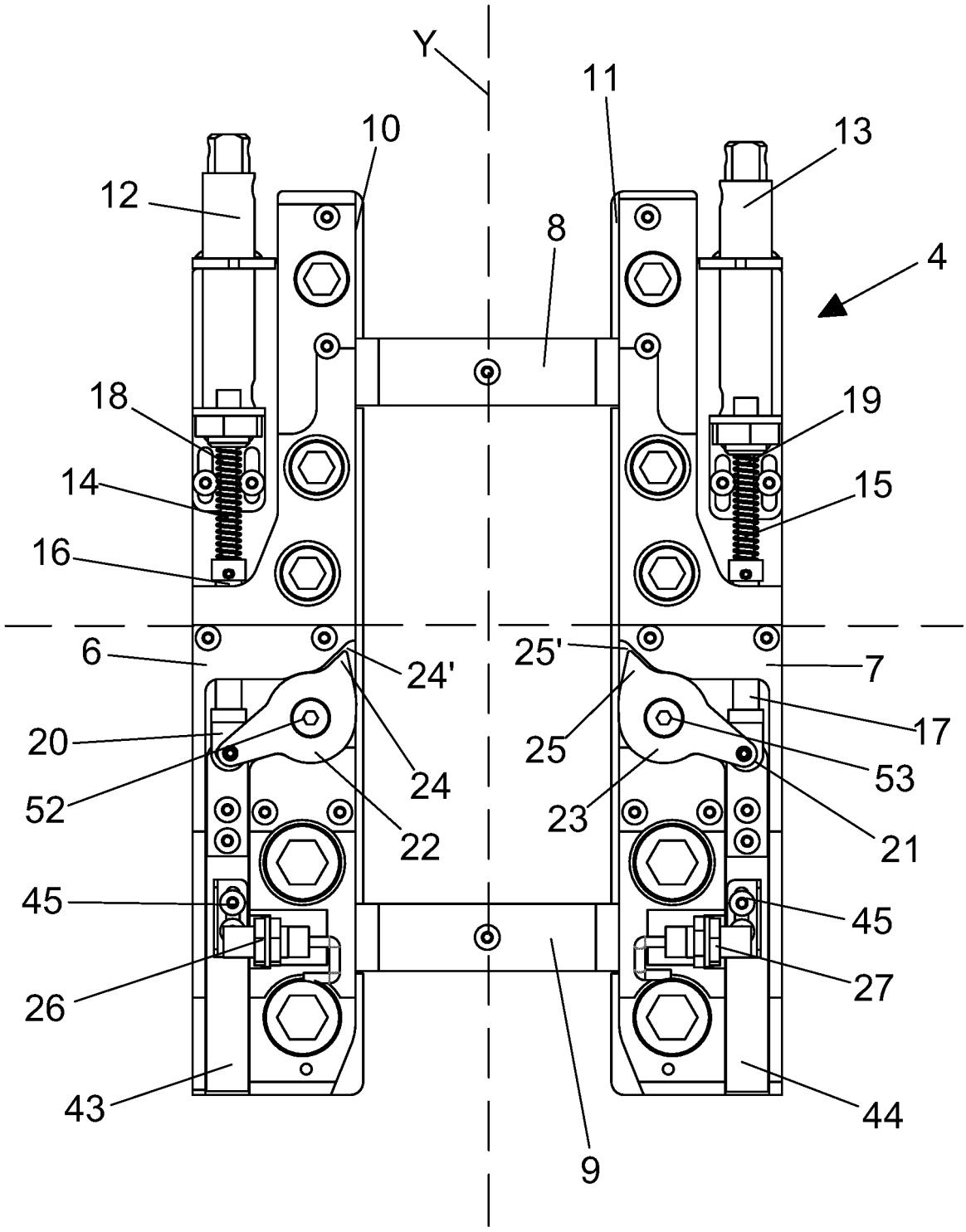
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Fig. 5

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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